## Space Weather Forecast

Issued on Saturday, 04 March 2023 at 01:21 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Chance of Minor/Moderate R1/R2 radio blackouts. Chance of Minor Geomagnetic Storms.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar activity has been High over the past 24 hours, with a strong X-class flare observed at 03/1752UTC from the largest and most complex sunspot region in the Sun's far northwest. This produced a Coronal Mass Ejection (CME), with model output pending. No other Earth directed CMEs are currently forecast. There are nine numbered sunspot regions on the current Sun, and one new emerging sunspot group in the southeast. Most of the regions on the Sun comprised small magnetically unipolar regions.

**Solar Wind / Geomagnetic Activity:** The solar wind was characteristic of a fast solar wind, and is currently close to 600 km/s. The number of particles in the solar wind was below average. The associated magnetic field was weak to moderate as was the all-important north-south component. The net effect of the above solar wind measures was for sub-Minor Geomagnetic Storm activity throughout, with Quiet to Active levels observed.

**Energetic Particles / Solar Radiation:** No solar radiation storms were observed.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** There is a chance (20%) of further High levels of X-ray activity, chiefly from the largest sunspot in the Sun's northwest through the UTC weekend. This spot should depart the front side during Day 1 (Saturday 4 March, leaving a tentative decrease in risk, although the sheer number of forecast arriving sunspot regions in the east may arrest or even reverse this decline, with analysis of arrivals pending.

**Solar Wind / Geomagnetic Activity:** No significant Earth-directed CMEs feature in the current forecast, however it is considered, pending Met Office model output, that a glancing blow from the strong flare CME might possibly arrive sometime during Day 3 (Monday 6 March). A fast wind is likely for much of this guidance period. This gives a Chance of Minor Geomagnetic Storm G1 throughout, probably peaking Day 3 with the possible arrival of the CME glancing blow.

**Energetic Particles / Solar Radiation:** Solar radiation carries a 40% chance of S1 or greater given the recent Strong class flare however this may decrease through the period as the largest sunspot group eventually rotates away from a peak geoeffective position during the new working week.

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Met Office

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**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 40 | 40 | 60 | 30 |
| Strong | G3 | No | 1 | 1 | 10 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | Yes | 60 | 50 | 40 | 40 |
| Very Active | R3 to R5 X | Yes | 20 | 10 | 5 | 5 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 40 | 40 | 20 | 10 |
| Very Active | ≥ S3 * | No | 5 | 5 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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